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Patients' Perspectives on the Design of Hospital Outpatient Areas

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Abstract: There is a growing interest among healthcare managers and designers in moving towards a 'patient-centred' design of health and care facilities by integrating patient perceptions and expectations of the physical environment where care takes place. Increased interests in physical environments can mostly be attributed to our improved understanding of their role in patients' health outcomes and staff productivity. There is a gap in the literature on users' perspectives on physical settings in the context of healthcare. Moreover, the connection of care services with the design of the facility is often overlooked partly due to the lack of evidence. This research was aimed at filling the gap by exploring outpatients' perspectives on design factors related to the areas frequented by them, e.g., hospital waiting areas. A 16-item questionnaire was conducted among randomly selected outpatients in two hospitals in Qingdao, China, with a response rate of 84.3%. Five principal factors were identified: sensory; lighting and thermal; facilities; spatial; and seating design, which agreed with the literature. Non-parametric tests were applied to assess variances in constructed principal dimensions concerning demographic variables. Female outpatients were found to be more perceptive of the 'sensory design' factors than males. The number of previous visits to the hospital was found to be associated with 'spatial' and 'seating design' factors, while respondents' age had an association with 'sensory' and 'seating design' factors. Respondents ranked 'noise' and 'air freshness' and 'cleanliness' as highly important.

Keywords: healthcare design; outpatients' perspectives; waiting areas; patient-centred design (PCD); patient-centred care (PCC)

1. Introduction

Patient healing is a complex and dynamic process, during which the role of the physical environment has been recognised and emphasised by many researchers due to its influence on patient health outcomes and wellbeing [1–3]. The interconnections between the characteristics of the physical environment and patient health outcomes emphasise the importance of the physical environment design in creating a healing environment [3–5]. Moreover, physical environment factors during both design and operation of buildings are important for sustainability [6], as well as for meeting the needs and expectations of stakeholders. There is, therefore, a growing interest in the patient-centred architectural design of healthcare facilities among researchers and service providers [7,8]. Patient-centred design (PCD) is a process involving design and evaluation that pays attention to facility users [9,10]; that is, human factors that affect the outcome of the healing process. It requires healthcare architects/designers making an effort to shape and reshape the healing environment, addressing patients' needs to provide satisfying healing experience and achieve desired outcomes of perceived service quality [11]. Traditionally, the quality of healthcare is evaluated by

professional practice standards, but, over the last decade, measurement of patient satisfaction has become popular [12]. With the aim of obtaining patients' perspectives about their care, it is increasingly being accepted as an essential indicator of the quality of care [13,14]. However, no consensus exists on which dimensions of care should be evaluated to measure patient satisfaction [15], primarily due to the multi-dimensionality of the concept of patient satisfaction. It has been observed that general patient satisfaction and patient perspectives of healthcare quality are sometimes interpreted interchangeably, but at closer inspection, they are different [16,17]. Patient satisfaction is often described as the patient's subjective experience during their provision of healthcare. It reflects the extent that their expectations and obligations of service standards are met [18]. Usually, when patients perceive that one or more of their expectations for care have been unmet, satisfaction as a whole suffers. Satisfaction reflects much more of personal preferences which are viewed as a broader concept while patient perspectives of service quality focus on dimensions of service. Although these are two different concepts, patients' perspectives of service quality and satisfaction have certain things in common [19].

Various methods to improve healthcare quality have been explored in the past. Researchers investigated patients' perspectives on diverse aspects of care service: waiting time [20,21], interaction and interpersonal skills [21,22], professionalism [23,24], occupancy [25], patient preferences and expectations [26,27], coordination of care [22,28], education and information provision [22,29,30], emotional support [31,32], and quality of medical care [33,34].

Currently, there is little research into patients' perspectives associated with built environment design factors in healthcare. Few researchers have explored the nature and the range of factors that patients consider important to their health and wellbeing. However, the perception of these factors on the design of healthcare facilities and how these can be better integrated into the process of facility design have largely remained overlooked [5]. In addition, as patients have become better educated about healthcare, their perspectives and expectations are changing as well, some previous aspects of measured attitudes may not adequately interpret patient's changing needs [17]. Therefore, this research is aimed to assess outpatients' perspectives of the physical waiting environment, investigating their opinion of a range of important hospital design indicators and reflecting on the building design process.

The rest of the paper is organised as follows. The methods applied in this paper for the development of the instrument and the conduct of the survey are discussed. Descriptive and statistical analyses of the obtained data are discussed next, followed by a contextual discussion. The article ends with a summary of findings and concluding remarks.

2. Methodology

2.1. Overview of Questionnaire Development

The questionnaire development followed four phases. First, the items of the questionnaire were generated based on an extensive review of literature and industry guidelines, conducted from January to May 2009. The purpose of the review was to determine the following:

- Factors related to the design of the physical environment in healthcare facilities;
- Outpatients' perspectives of the physical environment; and
- The physical-environment factors that affected outpatients' outcomes.

Keyword searches were conducted on the following databases: PubMed, ScienceDirect, Web of Science, Scopus, Ovid MEDLINE, the Cochrane Library and Design and Applied Arts Index. This enabled the first-step filtering of literature, which was refined further with keyword searches that were related to the scope and methods; for example, outpatient questionnaire, survey, physical environment, perspectives, healthcare waiting areas. Non-electronic sources were also consulted to identify potential sources for inclusion in the review. The filtered sources, both electronic and non-electronic, were first categorised based on their adopted methods and findings. Relevant design indicators were identified from this systematic review of the literature.

Second, one of the authors visited the two participating hospitals four times and carried out interviews with ten outpatients. A focus group (one-hour session) involving two outpatients, two care providers (nursing staff) and one administrative staff was conducted. In both the focus group and interviews, the objective was to compare the findings of the literature review with participants' perspectives of the waiting environment.

Third, a draft questionnaire was developed by incorporating the findings from the first and second stages. The questionnaire was first produced in English and then translated into Chinese for respondents' convenience. The draft questionnaire was then evaluated in a pilot study to analyse the comprehensibility and clarity of the items and attributes related to the psychometric properties of the instrument. The participating outpatients (n = 19) of the pilot study were asked to state any deficiencies of the content of the questionnaire, other potential sources of perspectives and significance of each item. The pilot study resulted in an amended final questionnaire with improved content validity.

The final structure of the questionnaire included 16 questions to rate the perspectives of the importance with regards to the dimensions of hospitals' waiting environment. Respondents were asked to rate their perspectives of an item on a Likert-type response scale, ranging from least important, unimportant, neither important nor unimportant, important and most important, transformed into a scale between 1 and 5—a higher score indicating a higher level of importance for the item. Demographic information such as age and gender were obtained from the participants. Data regarding number of visits, type of the appointment and the visited hospital department were recorded as well.

2.2. Ethical Approval and Study Sample

The ethical approval for the study was obtained in two stages. First, an ethical approval was obtained from the UK academic institution where the authors were based. Second, the research committees of the two participating hospitals gave approval to the study. Written consent was obtained for each interview carried out. The anonymity of respondents has been preserved, except when explicit permission was given to use titles or names. The study was conducted among outpatients in two Chinese hospitals in Qingdao, a coastal city in East China. The hospitals were chosen for this research because they serve a relatively large number of staff and patients offering us an opportunity to select the study sample from a wider background, and for the on-site world standard facilities so that the study findings can be interpreted against other international studies. One of the hospitals is affiliated with a medical college, and the other is the largest general hospital in the city. These two hospitals employ a total of approximately 5900 staff and have around 4000 beds. Respondents were selected to participate in the survey by random sampling from different outpatient departments. All participated respondents were over 18 years old, and they were informed in writing through an introduction to the survey section that the survey was voluntary, and the confidentiality of the data would be retained.

2.3. Data Collection

Some particular holidays (e.g., National day and Spring Festival) in China may create potential bias in the use of healthcare facilities due to festival decorations and lighting, and bring bias in outpatients' perspectives to the physical environment. Data for this study were, therefore, collected between 12 and 26 August 2009, a period in which there were no special holidays in China. The surveyed outpatients were randomly selected from each floor in the outpatient department in both hospitals, from 8:00 a.m. to 5:00 p.m., Monday to Friday, during the two-week study period, to capture all time stages of outpatients' visits. The researcher distributed the questionnaires to the sampled outpatients and explained the purpose of the survey. Informed consent was obtained from each participant in the study. All the survey items were completed by either the outpatients or their guardians (guardians were used if the sampled patients had difficulties in writing). The researchers also verified the questionnaires for completeness and correctness for completion. These completed questionnaires were collected on the spot when finished. A total 337 outpatients from the two Chinese

hospitals completed the questionnaires effectively out of 400 distributed, and the results were included in the study. The response rate was 84.3%.

2.4. Statistical Analysis

Most statistical analyses have been performed with IBM SPSS Statistics version 22.0 for Windows. Descriptive statistics on the item and scale frequencies, percentages, means and standard deviations (SD) were computed. Demographic and other related data were also analysed descriptively by computing frequencies and percentages. Internal consistency reliability was assessed via Cronbach's coefficient alpha [35], with $\alpha \geq 0.70$ as the recommended value since this study involved the comparison of groups of respondents [36]. The coefficient $\alpha \geq 0.70$ was regarded as acceptable, $0.80 \geq \alpha > 0.70$ as respectable and $\alpha \geq 0.80$ as very good.

Previous research suggested that a questionnaire with multi-item scales can be used to reduce random sources of errors to represent the theoretical concept [36]. This study, therefore, employs Principal Components Analysis (PCA) to identify the underlying structure characterising a set of highly correlated variables. Varimax rotation was applied to the principal component analysis (PCA) results, guiding the number of factors to be extracted. Items were included in the factors if there were substantial loadings (≥ 0.40). In the case of multiple loadings of an item on different factors, it was included in the factor with which the item had more conceptual relationship. The factors from the PCA results were easier to label and had good correspondence with other studies. After this, good construct validity and internal consistency were established for the questionnaire. Bartlett's test of sphericity was used to identify significant correlation between items. The Kaiser–Meyer–Olkin procedure for measuring sample adequacy was applied.

Chi-square and non-parametric tests were applied to analyse demographic effects and relationships among constructed dimensions. Statistically significant differences in perspectives between genders and appointment types were tested via Mann–Whitney *U*-test. Differences between the age groups (18–25, 26–35, 36–50, and >50 years) and visit times (1–2, 3–4, 5–10, and >10 times) were analysed using Kruskal–Wallis test with a $p < 0.05$ taken as statistically significant. Mann–Whitney *U*-test with a reduced *p*-value ($p < 0.01$) was used as a post hoc test to avoid the risk of finding significant differences by chance [37].

3. Results and Analysis

3.1. Respondents' Characteristics

Demographic and other clinical information from the respondents is given in Table 1. Among 337 surveyed outpatients, 124 (36.8%) were male and 213 (63.2%) were female. More than half of the male respondents were aged between 26 and 35, nearly a quarter of male respondents were aged between 36 and 50, 16 respondents were aged between 18 and 25 years and 14 male respondents were >50. Similarly, most female respondents were aged between 26 and 35 years with only 15 female participants >50. Male respondents visited the hospital less frequently than female. Table 1 shows 77.5% of female respondents have visited the hospital more than twice compared with a smaller number of 66.1% of male respondents. Most of the respondents pre-arranged their visits while only seven male respondents were admitted as an emergency. Outpatients were selected from 22 departments across the hospitals; the department of general surgery ($n = 79$) and respiratory ($n = 59$) represent the relatively higher number of returned questionnaires than other departments. The diversity of different departments ensured a wide range of respondents were represented in the study.

A descriptive analysis of the design indicators is given in Table 2, which shows the percentage of responses at each choice of the five-point scale. Mean and standard deviations (*SD*) of responses are computed for each design indicator. The questionnaire items are sorted in descending order, based on the mean response score. Standard deviations are generally small for higher mean response scores

(e.g., cleanliness; mean = 4.55, SD = 0.565) and relatively greater for lower mean scores (e.g., presence of coordinated art objects; mean = 3.18, SD = 0.943).

Table 1. Demographic information of the respondents.

Variable	Scale	Male (124)	Female (213)	*p* Value †	Total (%)
Age (year)				0.019	
	18–25	16	51		19.9
	26–35	64	84		43.9
	36–50	30	63		27.6
	>50	14	15		8.6
Number of visits				0.136	
	1–2	42	48		26.7
	3–4	37	71		32.0
	5–10	21	39		17.8
	>10	24	55		23.4
Appointment type				<0.001	
	Emergency	7	0		2.1
	Pre-arranged	117	213		97.9
Department				<0.001	
	Accident and emergency	0	4		1.2
	Burns	0	2		0.6
	Cardiac	0	2		0.6
	Chest surgery	5	11		4.7
	Chinese medicine	4	2		1.8
	Dermatology	0	8		2.4
	Elderly care	2	0		0.6
	Gastrointestinal	6	16		6.5
	General surgery	35	44		23.4
	Gynaecology	0	22		6.5
	Haematology	0	4		1.2
	Incretion	1	0		0.3
	Midwifery	0	2		0.6
	Neurosurgery/neurology	2	6		2.4
	Operating theatres	2	6		2.4
	Orthopaedics	4	16		5.9
	Otolaryngology	4	2		1.8
	Ophthalmology	11	25		10.7
	Paediatrics/neonatal	2	4		1.8
	Respiratory	30	29		17.5
	Stomatology	12	8		5.9
	Urology	4	2		1.8

† Chi-square test.

3.2. Principal Component Analysis

An exploratory factor analysis was carried out by performing a principal component analysis (PCA) with an orthogonal varimax rotation for the 16 individual items at a significance level of $p < 0.001$. Orthogonal varimax rotation is chosen because of the unrelated nature of produced factors [38]. Factor solution was based on Bartlett's test showing a significant correlation between items (Chi-square = 2444.295; $p < 0.001$) and the Kaiser–Meyer–Olkin test for sample adequacy measuring 0.838 which is considered 'great' by Field [39]. These indices implied that the matrix was well suited for factor analysis. An initial analysis was run to obtain eigenvalues for each component in the data. Five summated indices from the 16 question items that had eigenvalues greater than 1.0 represented five different scales. Factor 1 consisted of three items accounting for 34.7% of the variance, Factor

2 represented four items accounting for 14.7% of the variance, and Factor 3 had four items which accounted for an additional 8.5% of the variance. Factors 4 and 5 had three and two items which accounted for 6.8% and 6.4% of the variance, respectively. The total variance is 71.2%. Given the large sample size and the convergence of the scree plot and Kaiser's criterion on five components, this is the number of components that were retained in the final analysis. Table 3 shows the factor loadings after rotation. These five scales of design were identified as sensory, facilities, spatial, lighting and thermal, and seating design.

Table 2. Descriptive analysis.

Questionnaire Items	Response * (%)					Mean	SD
	1	2	3	4	5		
Cleanliness	0.0	0.0	3.6	37.7	58.8	4.55	0.565
Air freshness	0.0	0.0	5.9	35.3	58.8	4.53	0.607
Noise	0.0	2.1	13.9	34.1	49.9	4.32	0.789
A thermally comfortable environment	0.0	0.6	12.8	53.1	33.5	4.20	0.671
Seating sufficiency †	0.3	0.6	12.8	53.7	32.6	4.18	0.689
Adequate illumination ‡	0.0	1.5	23.4	45.4	29.7	4.03	0.769
Spaciousness	1.2	1.5	23.1	52.2	22.0	3.92	0.783
Availability of daylight	0.0	1.5	28.2	50.7	19.6	3.88	0.725
Seating comfort	0.9	4.5	29.1	38.6	27.0	3.86	0.896
Architectural design of the space	0.6	5.3	40.1	34.4	19.6	3.67	0.870
Pleasant colour scheme	1.2	7.7	40.9	38.6	11.6	3.52	0.842
Indoor plants, interior/exterior landscaping	2.7	8.0	42.7	39.5	7.1	3.40	0.840
Exterior view	2.4	11.3	50.4	30.0	5.9	3.26	0.825
Presence of coordinated art objects	3.9	16.9	44.5	26.4	8.3	3.18	0.943
Furniture layouts	3.9	8.9	57.3	26.4	3.6	3.17	0.789
Entertainment facilities	1.2	21.1	49.3	23.4	5.0	3.10	0.828

* 1: Least important; 2: Unimportant; 3: Neither important nor unimportant; 4: Important; 5: Most important.
† Adequate number of seats. ‡ Overall lighting: artificial and natural lighting combined.

Table 3. Rotated component matrix of questionnaire items.

Questionnaire Items	Components				
	Sensory	Facilities	Spatial	Lighting and Thermal	Seating
Air freshness	0.856	-	-	-	-
Cleanliness	0.833	-	-	-	-
Noise	0.719	-	-	-	-
Exterior view	-	0.805	-	-	-
Presence of coordinated art objects	-	0.781	-	-	-
Indoor plants, interior/exterior landscaping	-	0.696	-	-	-
Entertainment facilities	-	0.574	-	-	-
Furniture layouts	-	-	0.791	-	-
Architectural design of the space	-	-	0.755	-	-
Pleasant colour scheme	-	-	0.669	-	-
Spaciousness	-	-	0.566	-	-
Availability of daylight	-	-	-	0.792	-
Adequate illumination	-	-	-	0.720	-
A thermally comfortable environment	-	-	-	0.574	-
Seating sufficiency	-	-	-	-	0.805
Seating comfort	-	-	-	-	0.773
Cronbach's alpha coefficient (0.870)	0.792	0.768	0.784	0.850	0.714
Percentage of explained variance (71.2)	34.714	14.713	8.482	6.819	6.437

3.3. Internal Consistency Reliability

The reliability of each attribute was examined by the Cronbach's alpha coefficients. The obtained values of the reliability estimates were all greater than 0.70 as shown in Table 3, indicating a strong internal reliability among items with the same attributes. Table 3 also shows the internal consistency

reliability level (Cronbach's alpha coefficients) for each generated factor that 0.792 for sensory design, 0.768 for facility design, 0.784 for spatial design, 0.850 for lighting and thermal design and 0.714 for seating design. Combined, these five factors explained 71.2% of all variables and the Cronbach's alpha coefficient for the overall scale was 0.870.

3.4. Relationship of Personal Information and Perspectives of Design Factors

Non-parametric tests were carried out on 16 questionnaire items, as shown in Table 4. Results show that there is a significant difference in perspectives between male and female outpatients in the sensory design aspect including air freshness, cleanliness and noise. Age has a significant effect on the perspectives of both sensory and seating design aspects. Patients do not have significantly different perspectives regarding the appointment type. However, the findings suggest the number of visits to the hospital has influenced their perspectives on spatial and seating aspects, which represent six out of sixteen items in the whole questionnaire.

Table 4. Comparison of mean principal component analysis (PCA) scores between demographic variables.

Questionnaire Items		Components				
		Sensory	**Facilities**	**Spatial**	**Lighting and Thermal**	**Seating**
Gender	Male	4.31(0.53)	3.22(0.64)	3.56(0.66)	3.89(0.68)	4.01(0.69)
	Female	4.45(0.52)	3.24(0.67)	3.57(0.63)	3.99(0.72)	4.01(0.71)
	p-value †	**0.046** *	0.703	0.929	0.184	0.952
Age(year)	18–25	4.34(0.55)	3.30(0.61)	3.59(0.67)	3.95(0.72)	4.14(0.77)
	26–35	4.45(0.51)	3.30(0.69)	3.66(0.64)	4.04(0.65)	4.12(0.67)
	36–50	4.42(0.52)	3.16(0.53)	3.47(0.54)	3.92(0.72)	3.87(0.64)
	>50	4.19(0.56)	3.00(0.91)	3.37(0.81)	3.69(0.82)	3.69(0.77)
	p-value ‡	**0.002** *	0.169	0.265	0.839	**0.007** *
Appointment type	Emergency	4.57(0.35)	3.54(0.70)	4.03(0.47)	4.57(0.53)	4.36(0.56)
	Pre-arranged	4.39(0.53)	3.23(0.66)	3.56(0.64)	3.95(0.70)	4.01(0.71)
	p-value †	0.978	0.329	0.071	0.109	0.562
Number of visit	1–2	4.51(0.51)	3.31(0.66)	3.64(0.67)	4.11(0.75)	4.14(0.69)
	3–4	4.39(0.52)	3.31(0.64)	3.70(0.62)	4.02(0.68)	4.11(0.71)
	5–10	4.30(0.64)	3.10(0.79)	3.38(0.59)	3.85(0.79)	3.86(0.76)
	>10	4.36(0.43)	3.16(0.55)	3.45(0.62)	3.79(0.55)	3.89(0.64)
	p-value ‡	0.143	0.774	**0.008** *	0.755	**0.010** *

† Mann–Whitney *U*-test; ‡ Kruskal–Wallis test; * $p < 0.05$.

4. Discussion

Among the dimensions of the waiting environment evaluated by 337 outpatients, *cleanliness* (mean = 4.55) was ranked as the most important indicator, followed by 'air freshness' (mean = 4.53) and 'noise' (mean = 4.32). 'Entertainment facilities' (mean = 3.10) was the least important indicator in the overall waiting environment, which together with 'furniture layouts' (mean = 3.17) and the 'presence of coordinated art objects' (mean = 3.18) were ranked as the bottom three (Table 2). The reason for relatively low scores in these three items may be due to the physical situation in both surveyed hospitals. On the one hand, there is a big number of outpatients every day (average number of daily hospital outpatient visits was nearly 1500 in the surveyed departments), and the waiting rooms are always full of patients and their families, some patients even have to wait outside in the corridor. All the patients are waiting to meet care providers in a queue, not like in some hospitals in developed countries with an electronic queuing system to display patient numbers on a flat screen. The outpatients in the surveyed hospital have to pay more attention to being called rather than entertain themselves. On the other hand, some outpatients suffered from illness and had no mood to watch TV or reading newspapers at all. Airflow rate has an important to role to play in ventilation [40] and the perception of air freshness. However, although most outpatients did not consider entertainment facility and art

objects in hospital as important as other aspects, they are welcomed in some inpatient unit design [41] and suggestions have been made to supply newspaper or magazines to improve the entertainment in particular departments [42].

Results also show that the overall rating scores are quite high ranging from 3.10 to 4.55, indicating the importance of questionnaire items. Six out of sixteen items had mean scores higher than 4 (=important) and the remaining ten items all had mean scores higher than 3 (=neither important nor unimportant). Regarding constructed dimensions, sensory design, seating design, the design of lighting and thermal environments was of concern to the respondents since all the eight surveyed items under these dimensions had the highest mean scores, compared with items under the dimensions, 'spatial' and 'facilities'.

From the results of surveyed items, relatively high rating scores indicate respondents prefer more natural daylight and adequate illumination when they are waiting for the doctors. A large body of evidence shows that exposure to bright artificial light and daylight is effective in reducing depression and improving patients' mood [43]. Furthermore, research indicates the exposure to light is critical to patient and staff health and wellbeing in healthcare settings [44–46]. However, excessive daylight can also cause visual discomfort through glare and distraction, which is affected by window design. A big window size could let more daylight come in and at the same time will consume more energy in heating or cooling [47]. Therefore, there is a trade-off that needs to be reconciled for designing the window area and providing enough daylight in the room [48].

Mean scores received from female outpatients were higher than male in most of the surveyed items except the architectural design of the space (mean scores 3.61 vs. 3.78); indoor plants, interior/exterior landscaping (3.39 vs. 3.43) and seating comfort (3.85 vs. 3.89). Results from non-parametric test show there is a significant difference of perspectives on sensory design aspects between male and female. Female respondents highly evaluated the importance of air freshness (4.55) and cleanliness (4.60). It is a fairly natural response because these two items are frequently reported in the literature as most important attributes of a physical environment. Also, women in China are more responsible for housing and cleaning than men, which may lead to a higher expectation of the environment they spend hours staying. Cleanliness is also considered the most important as it was ranked the first place in the mean scores of respondents' perspectives. Such result is in line with another study conducted by the authors in which cleanliness was ranked in first place with regards to the hospital accommodation environment by a group of surveyed inpatients [17] and care providers [49]. Similar results were also found by Shah and Dickinson [50], who investigated the factors patients might consider when choosing hospitals and the weight of the factors during decision making. The results from their study showed hospital cleanliness was the most important factor followed by hospital reputation and seven other factors. For patients, cleanliness is inexorably related with healthcare associated infections (HAIs; therefore, it is necessary for any healthcare facility to maintain a high standard of cleanliness.

Noise is the most frequently studied environmental factor in hospitals that relates to both patient and care providers [43]. Hagerman et al. [51] found a relationship between the noise level in patient rooms and patient satisfaction. They also found a bad acoustics environment is likely to produce a bad working environment for staff that could adversely affect the patients. Males and females have different perspectives on the ambient environment because males may be more tolerant than females [52]. This argument is supported by this study that females consider noise is more important in the hospital design than their male counterparts (4.40 vs. 4.18).

The analysis also shows that females are more perceptive than men on the summated five factors except they have the same mean score on seating environment (4.01 vs. 4.01). A significant difference in perspectives based on gender was found for sensory design within the constructed dimensions. Females considered that sensory design (air freshness, cleanliness and noise) to be more important (mean score = 4.45) than males (mean score = 4.15). This result suggests that women are more perceptive of overall sense-sensitive design factors, which is in accordance with previous research showing women have greater sensitivity in sensory factors than men [53–55].

There is a significant difference in respondents' perspectives based on age for the dimensions of sensory and seating design. In this study, seating dimensions include two indicators: seating sufficiency and seating comfort. Results show that the younger respondents thought seating dimension more important than older respondents, where mean score from 18–25 years old outpatients was 4.14 and 3.69 by outpatients >50. It is speculated that younger respondents require more interaction in the waiting room rather than merely waiting for the doctor's call. Evidence has been highlighted in one of Ulrich's [1] paper that in waiting rooms, day rooms, and lounges, the widespread practice of arranging seating side-by-side along the walls of a room markedly inhibits social interaction among patients or other users, which corroborates long-held views by Holahan [56] and Sommer and Ross [57]. Younger outpatients also evaluated all the five design dimensions with higher mean scores compared with older outpatients (>50 years). However, lateral comparison within the five dimensions indicates that older patients thought sensory design factor more important (mean score = 4.19) and the facilities design factor (mean score = 3.00) the least important.

Most research has assessed patients' satisfaction as the patient outcome measure through evaluation of healthcare service and quality of care. Very few studies link the number of patient visits to how their satisfaction with the healthcare environment. This study has identified outpatients' perspectives regarding their frequency of visits to the hospital. Respondents who have been to the hospital for more than five times have relatively low mean scores (lower than 4.00) in all four dimensions except the 'sensory design'. This may be because people who visited the hospital more times will have fewer expectations of their known environments. People are more perceptive of environments with which they are unfamiliar. It may also relate to hospital waiting times in China; patients who are more familiar with the environment would choose to visit at a time which is less crowded. It is also reflected in the answers from the interview that some outpatients "prefer to come in the afternoon to avoid waiting and delay in the morning".

In addition, other than the sensory design factor, seating design has been rated more important than the other three environmental aspects. Significant differences in outpatients' perspectives were found in the spatial and seating dimensions. Patients visiting hospital less frequently thought the seating environment more important than patients having visited hospital more often. This result is agreed by other researchers; for example, Tsai et al. [58] found that the 'body-contact environment', including seating environment, is perceived less favourable by first-time visitors. This may be due to their dissatisfaction with the high volume of patients and insufficient seats. In China, a similar situation is shared as they have the largest number of outpatients in hospitals every day. As discussed earlier, good arrangement of seats may enhance the interaction between patients. Nevertheless, the waiting room's crowded conditions often lead to patients' discomfort with their surroundings. Therefore, such factors make them more important in outpatients' perspectives and deserving of more attention in the design process.

5. Research Limitations

This study entails several limitations. First, this study excluded respondents who are younger than 18 years old. The overall response rates reached 84.25%. Unlike other studies, this response rate excludes questionnaires with missing values; it would be possible to have more valid responses to certain questions if missing values were included.

Second, although respondents' social and demographic information was obtained, there is more information worth recording from outpatients, such as educational background and monthly income. However, considering the cultural preferences and circumstances where the questionnaire survey was conducted, some patients may feel the answers to questions on income are too private to give.

Third, due to the unbalanced development of healthcare in urban and rural communities in China, there are differences in urban and rural healthcare infrastructures. This study focused on outpatients' perspectives from two urban healthcare centres, and the findings may not be representative of the overall Chinese healthcare facilities.

Fourth, the relatively high response rate in the present study promised a good interpretation of the results, as response rates are crucial concerning the generalisability of results [59]. However, it is necessary to point out that differences may exist in perception between non-respondents (uncompleted surveys) and respondents. To reduce the influence of the lacking responses, the present study was completed anonymously to diminish the influence of social desirability, gratitude and dependence, therefore, it is feasible not to include responses from incomplete surveys.

Finally, validation is a continuous process, and further studies are required to confirm these results. The experimental nature of these studies may have included bias in questionnaire responses. Thus, there is a need to replicate findings using confirmatory statistical methods using the data from non-experimental, routine studies.

6. Conclusions

Many studies have explored outpatients' satisfaction regarding the healthcare service they receive from specific dimensions, such as waiting experience, interaction with care providers and quality of care. However, findings from such research seldom provide useful insights on not-so-tangible aspects of healthcare design in the decision making. This research was aimed to address the need for a reliable and valid instrument associated with design indicators of waiting areas in healthcare facilities via assessing outpatient's perspectives.

The present questionnaire is a 16-item self-completed questionnaire on a five-point Likert-type scale. Questionnaire development was based on an extensive literature review and the views of sample outpatients who felt that the relevant aspects of outpatients' perspectives were adequately covered. The developed questionnaire is acceptable to outpatients while maintaining comprehensibility in its coverage of important aspects of patient experience in outpatient departments [30]. Descriptive and principal component analyses were conducted on the obtained data; non-parametric tests were applied to identify if there were significant differences in patients' perspectives of the constructed PCA factors with demographic variables. A relatively good response rate and minor comments reported by the participants indicate that this questionnaire can be used to understand and extract outpatients' perspectives of the importance of design indicators on the healthcare waiting environment. The instrument has undergone a testing process for reliability and validity, which supports its application as a measure of patients' perspectives. The core scales are supported by the results of the factor analysis. PCA confirmed the hypothesised dimensional structure of the questionnaire, yielding five factors. The initial grouping of the items as shown in this study should be considered in relation to the explorative nature of the research. The interpretation of the factors was based on the loadings of each item on each factor. Items with the highest loadings on a factor were considered as most strongly related to that factor and thus referred to that factor [60]. The high levels of internal consistency reliability for information and hospital standards suggest that the items comprising these hypothesised scales are sufficiently related.

Among the investigated design indicators, 'design for cleanliness' was ranked as the most important, followed by 'air freshness' and 'noise', both with mean scores above 4.30, indicating that they are high on the agenda for inpatients. These three indicators formed 'sensory' design in the constructed dimensions. In other words, respondents considered conventional environmental design factors to be highly important, more than other design factors. The lowest ranked item was 'entertainment facilities', followed by 'furniture layouts' and 'presence of coordinated art objects'. All three had mean scores above 3.10 and were part of the 'facilities design' factor, indicating that, although the factors were at the bottom of the list, the respondents considered them to be important, but not as important as the environmental design factor.

The research findings are important for integrating outpatients' perspectives in the design process. It is interesting to anticipate the integration of evidence-based design of healthcare facilities with perspectives of facility users. However, further research is required to validate and confirm current findings in different geographic regions.

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